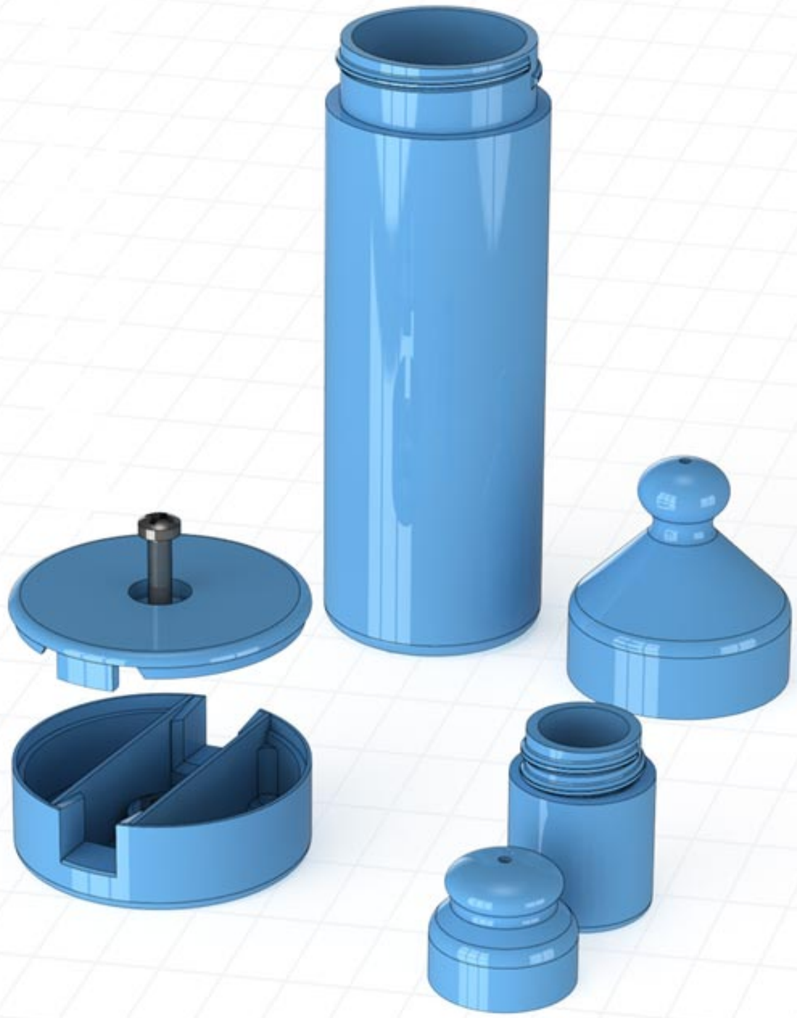
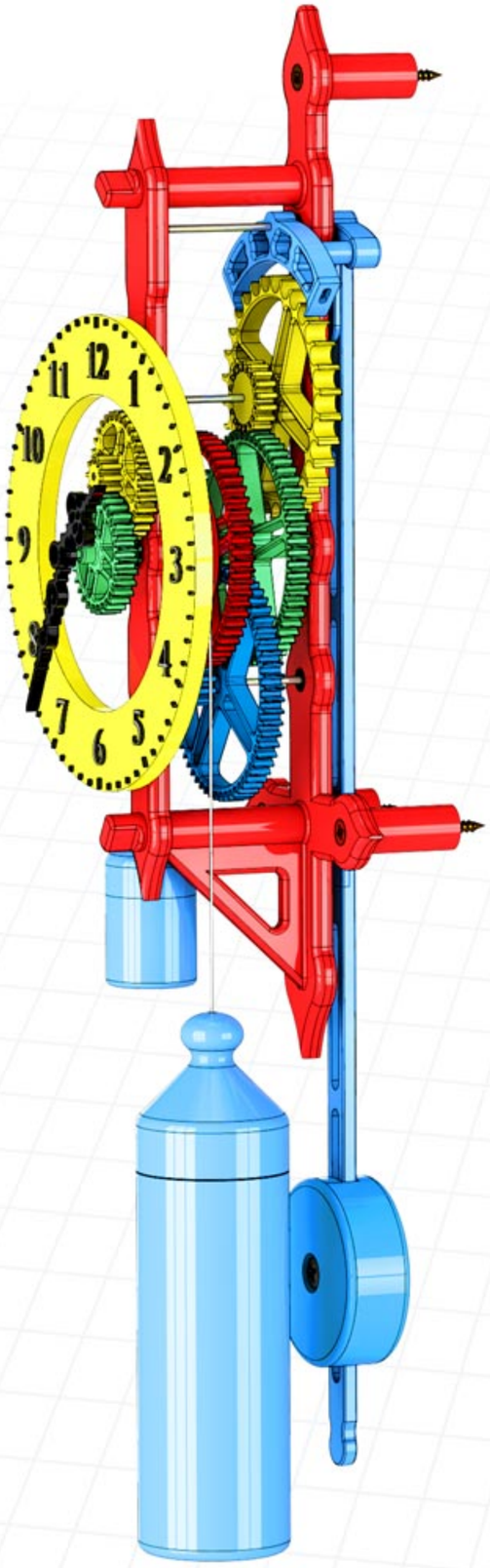




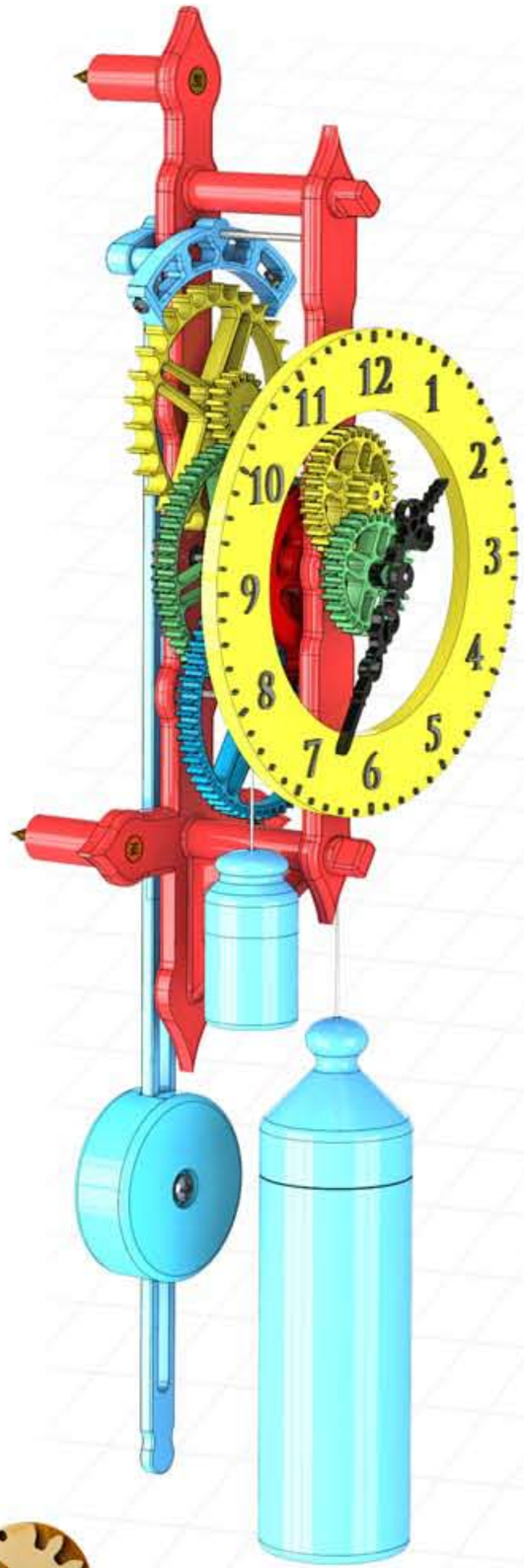
Brian Law's Woodenclocks

Clock 13 FDM Version

Build instructions

December 2015

www.woodenclocks.co.uk



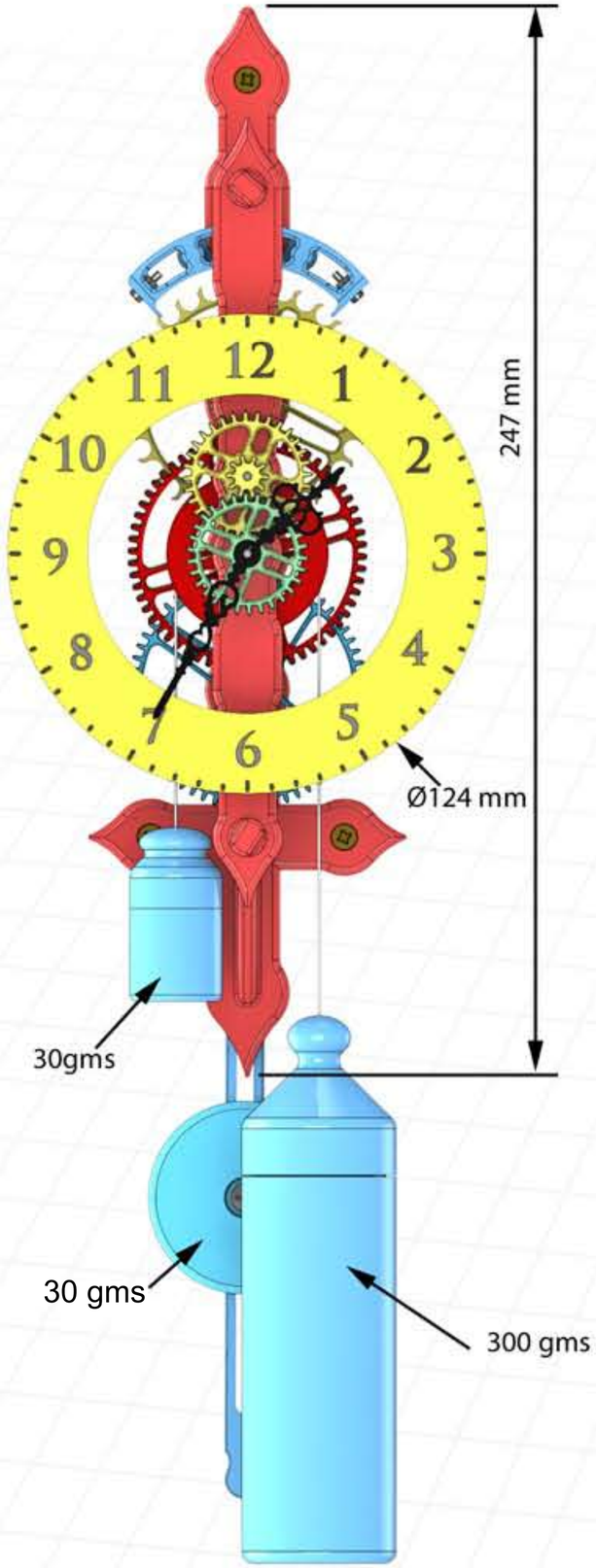
Clock 13 was originally designed to be built using Stereolithography, but it soon became apperent that a version for FDM build was needed and so this clock was the result.
It uses the the same basic design developed for the original but with some changes to improve its suitability for FDM printing, and with changes to the Escapement / Pendulum to make it more practical to build.

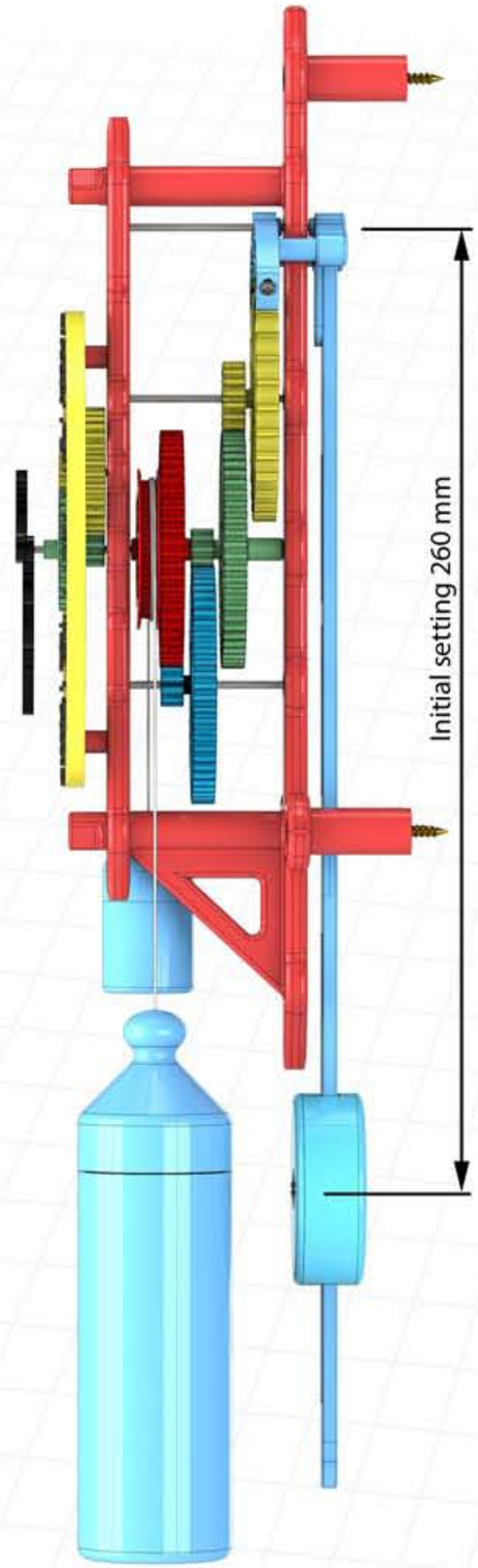
Many of the parts have been split into 2 or more components to reduce the need to add supports during the printing of the part. Liquid solvent bonding is used to glue all the necessary parts together.
The back plate is also offered in 2 forms , one whole and one split into a top and bottom section to help it to fit onto smaller print beds. It is split along the top of the bottom cross member so that it doesn't effect the accuracy of the hole spacing.

I printed the dial in 2 colours as the machine I was using (Zortrax) although not fitted with two printing heads allowed printing to be paused and the filament changed. If you can't do that then you will need to paint the top face of the up-raided numerals.

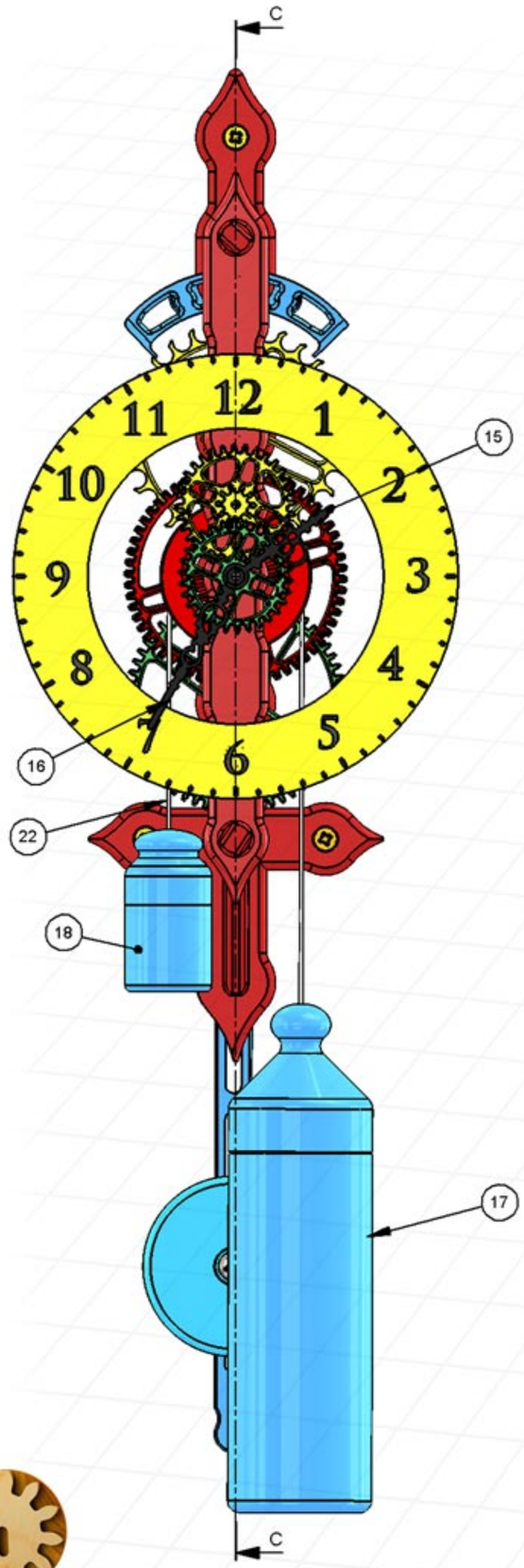
I have sized the parts mainly so that the small holes come out under size to allow you to drill out the part to get the correct fit. You are going to need tight and loose fits at different points in the assembly so you will need to have Ø1.9mm Ø2mm and Ø2.1mm drills. In the case of the bearings the holes are sized to give a press fit, so you may need to adjust that for your printer.

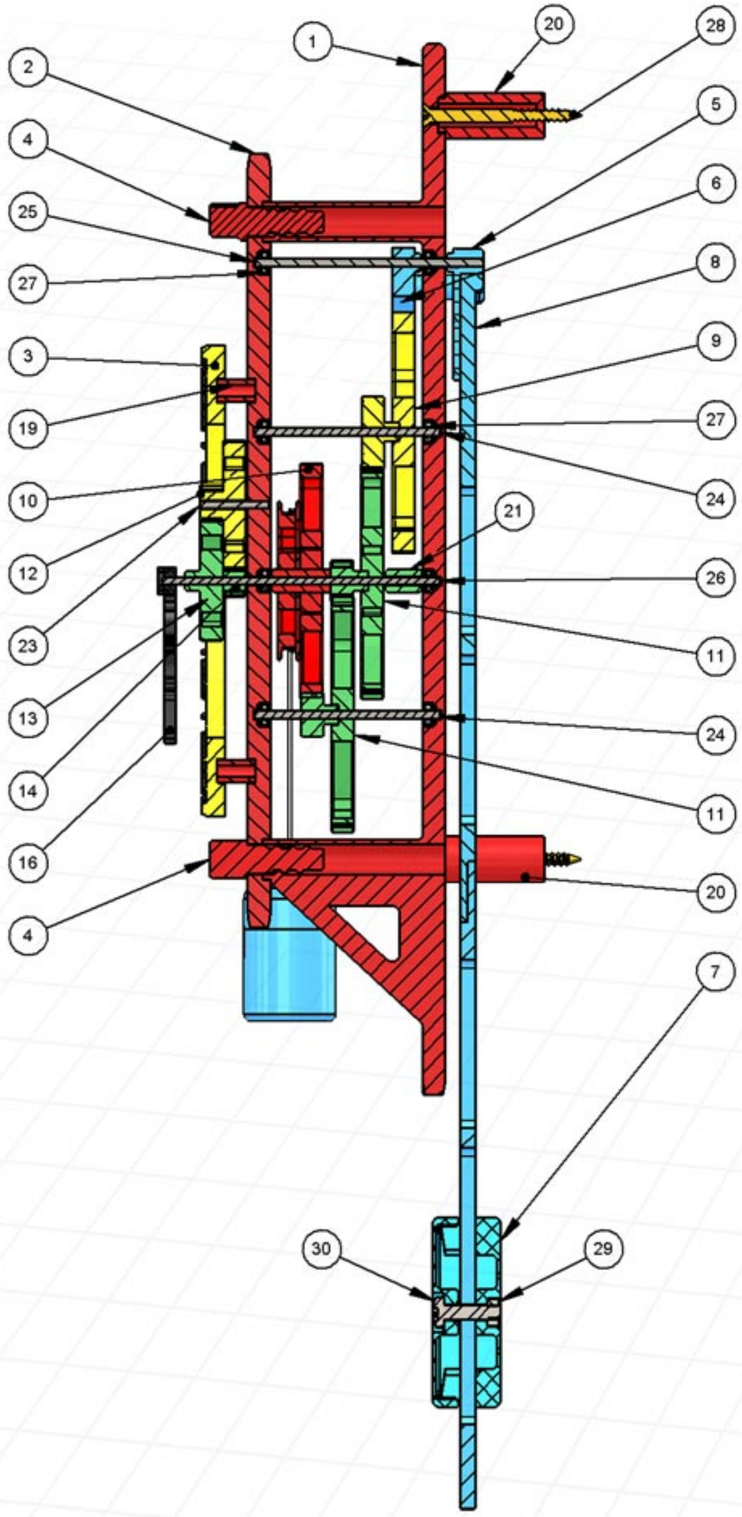
To drive the clock you will need weights, I have used Ø8mm steel balls fill both the main weight and the counterweight, and small nails used in the Pendulum Bob.





Clock 13 FDM Version - 1





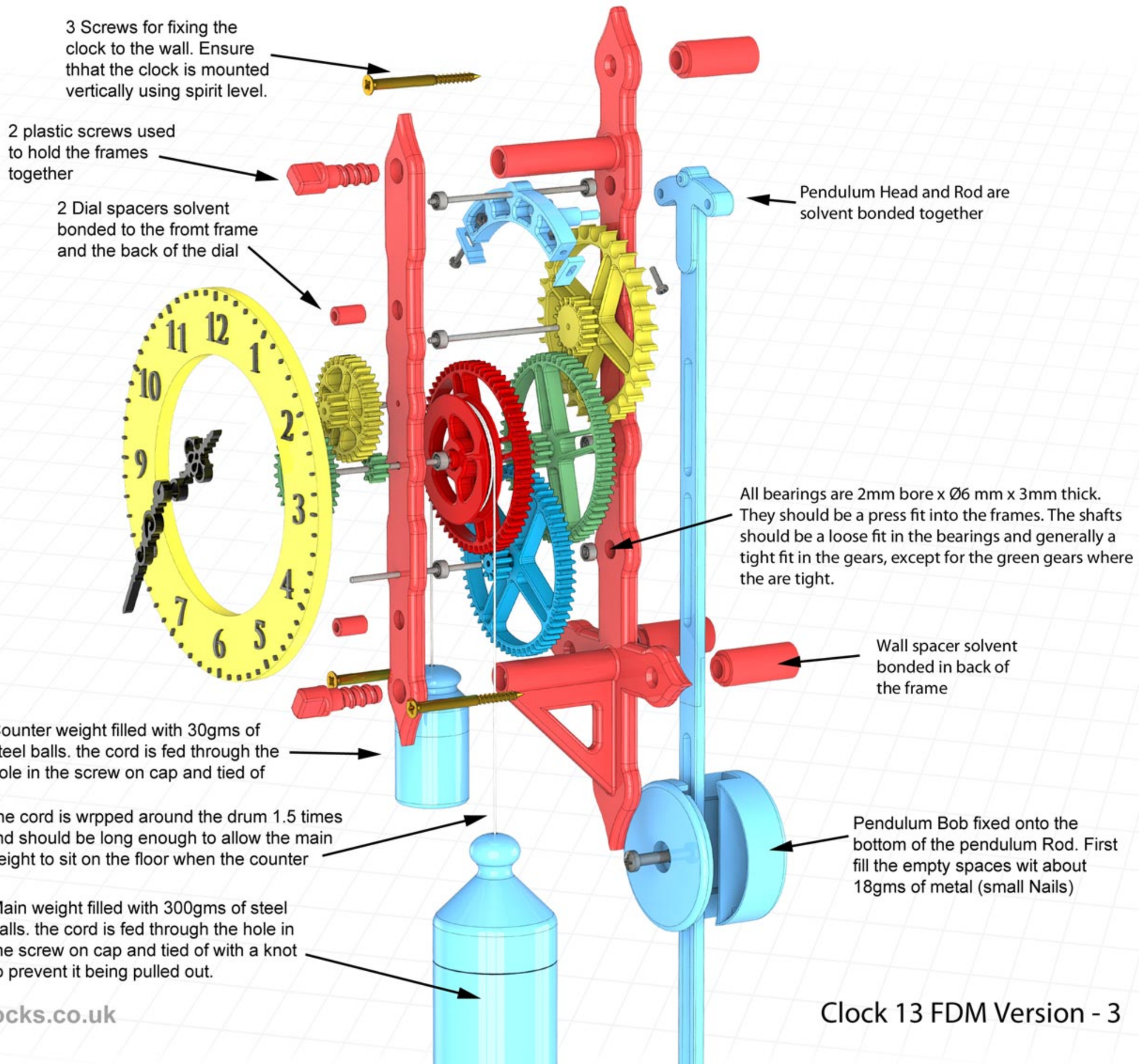
SECTION C-C
SCALE 1 : 1.1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Clock 13 Back Plate-FDM	ABS	1
2	Clock 13 Front Plate-FDM	ABS	1
3	Clock 13 Dial	ABS	1
4	Clock 13 Screw	ABS	2
5	Clock 13-Pendulum Head	ABS	1
6	Clock 13 Escapement	ABS	1
7	Clock 13 Pendulum Bob	ABS	1
8	Clock 13-FDM-Pendulum Rod	ABS	1
9	Clock 13 Timing Wheel	ABS	1
10	Clock 13-Drive wheel	ABS	1
11	Clock 13 60-10 Teeth	ABS	2
12	Clock 13 32-10 teeth	ABS	1
13	Clock 13 30 teeth	ABS	1
14	Clock 13 8 teeth	ABS	1
15	Clock 13 Hour Hand	ABS	1
16	Clock 13 Minute Hand	ABS	1
17	Clock 13 Main weight	ABS	1
18	Clock 13 Counter weight	ABS	1
19	Clock 13-Dial Spacer	ABS	2
20	Clock 13-Wall Spacer	ABS	3
21	Clock 13 Rear Gear Spacer	ABS	1
22	Clock 13 cord	Brauded cord 1mm diameter	1
23	Clock 13 Shaft 18	Silver steel Ø2mmx 18mm long	1
24	Clock 13 Shaft 56	Silver steel Ø2mmx 56mm long	2
25	Clock 13 Shaft 61	Silver steel Ø2mmx 61mm long	1
26	Clock 13 Shaft 80	Silver steel Ø2mmx 80mm long	1
27	Clock 13 Bearing 2mm	Stanless Bearing Ø2 borexØ6O\Dx3mm	8
28	Woodscrew		3
29	Nut 4mm		1
30	Screw 4mm		1

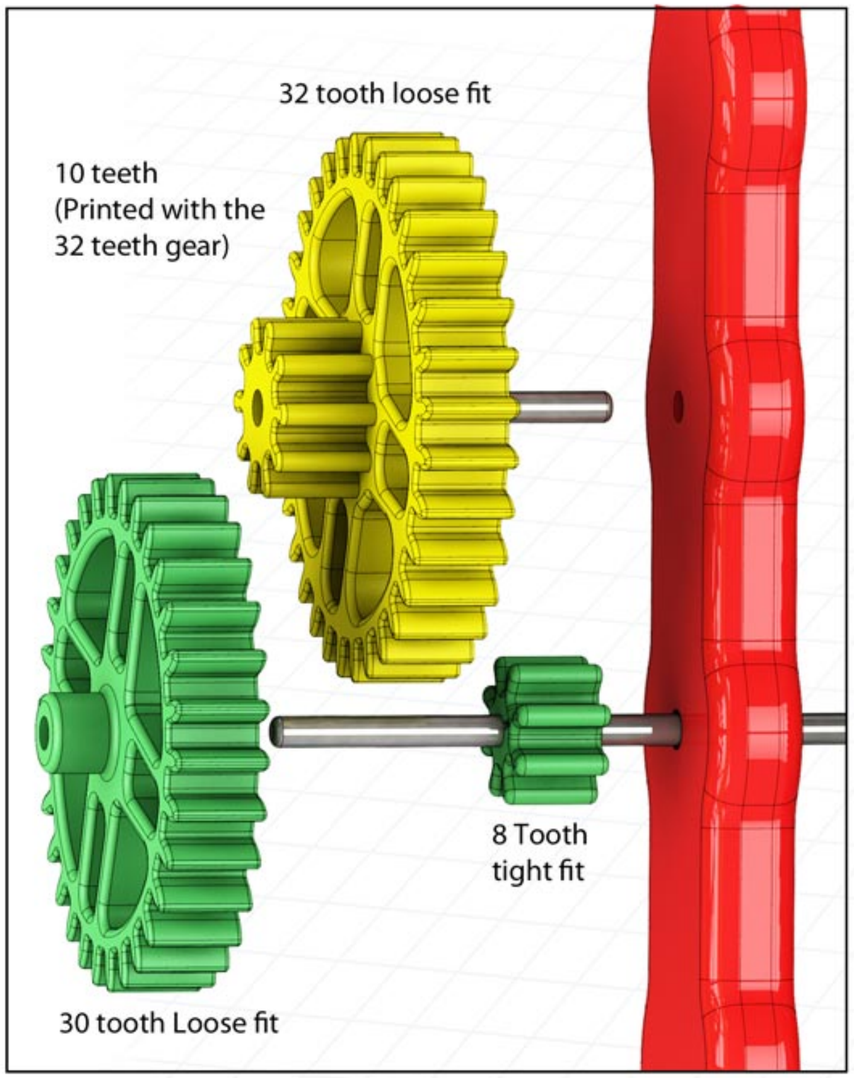
Silver Steel is a UK name for Tool steel ground rod or Drill rod available in 13" lengths

If you can't find metric materials you can use Ø5\64" instead and change the bearing to a Ø5/64 equivalent. Rember that you will need to change the bearing recess's in the front and back plates to Ø1/4"

Clock 13 FDM Version - 2

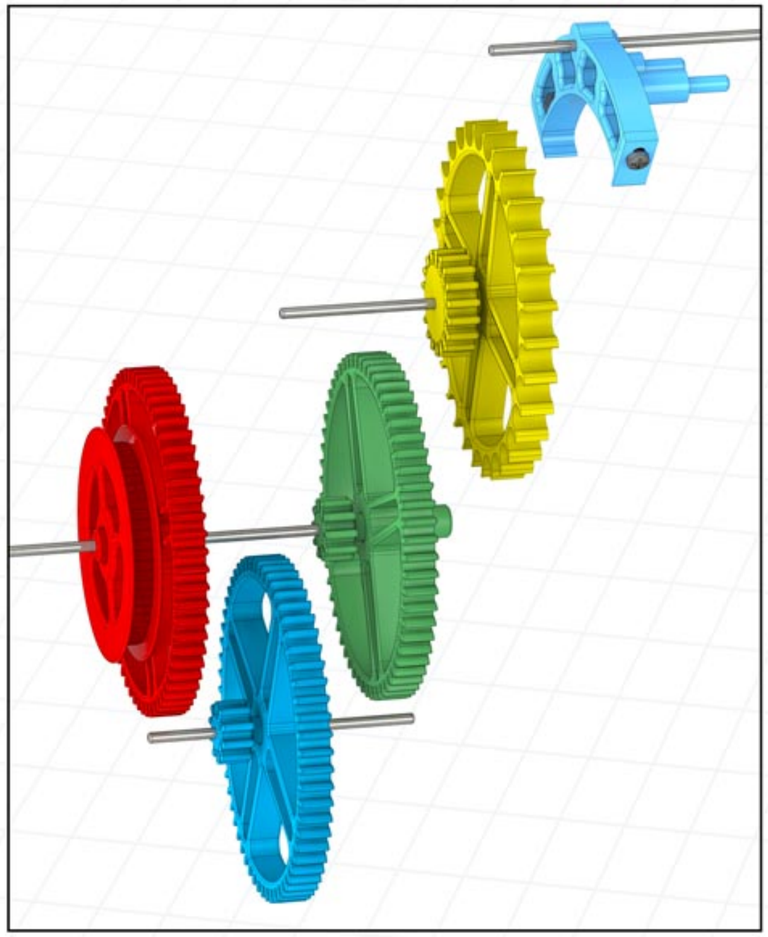


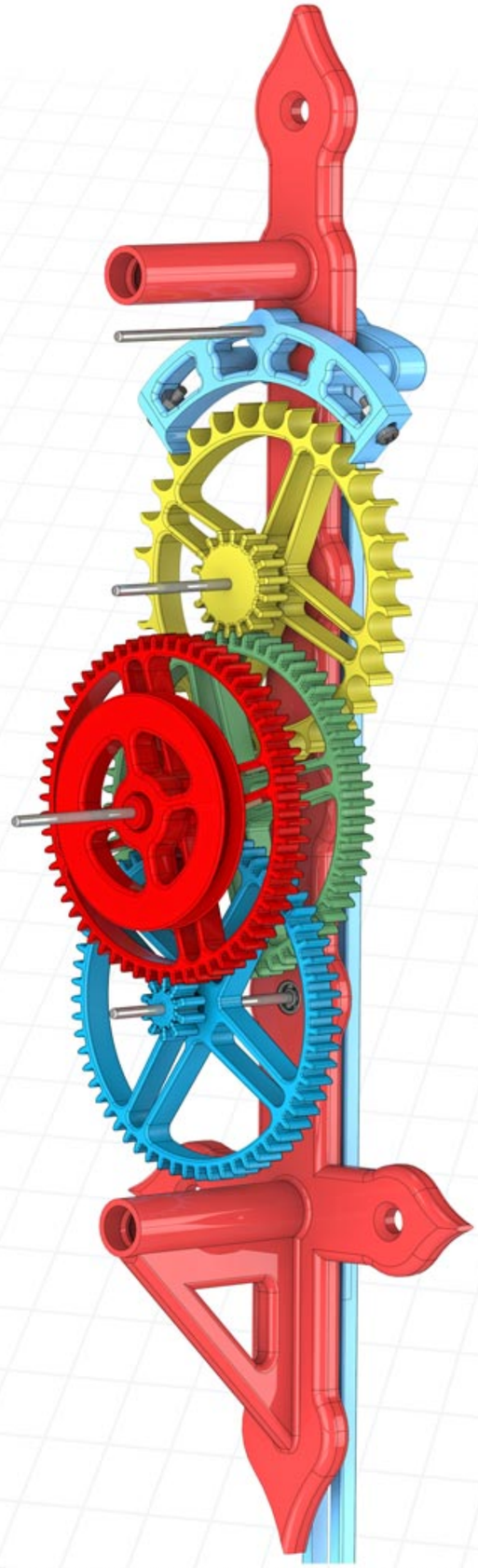
Clock 13 FDM Version - 3



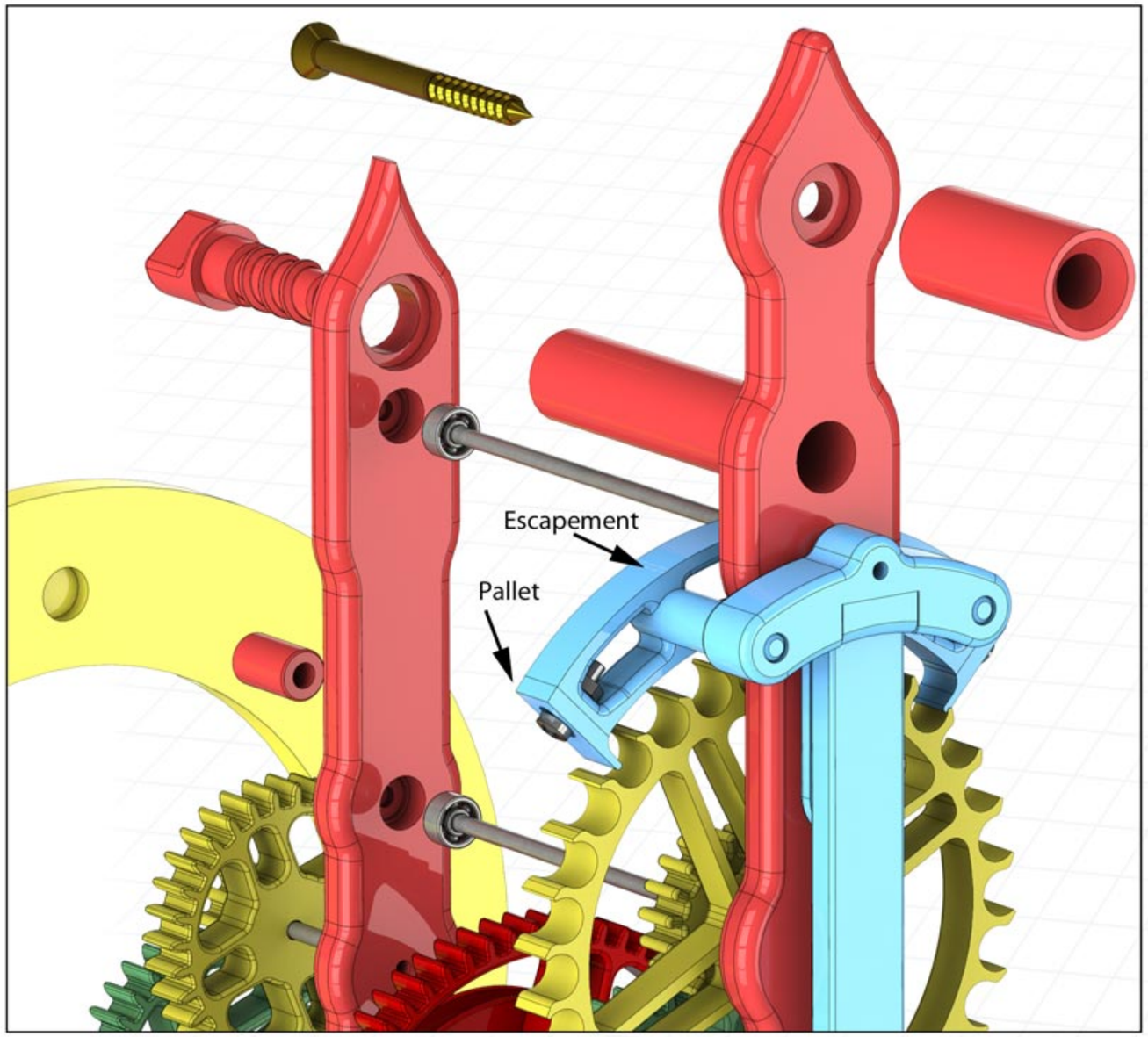
Fit the gears onto their shafts using the dimensions on the cross section shown on the next sheet. The gears should be a tight fit on the shafts so that once positioned they won't move. The exception is the green gear which should be a loose fit.
The shafts should be pushed into the gears using a Drill press or Lathe or even a Vice to make sure they are pushed in square, otherwise the gears may wobble when fitted to the bearings.

Remember to fit the Rear spacer behind the green gear to stop it moving out of position.

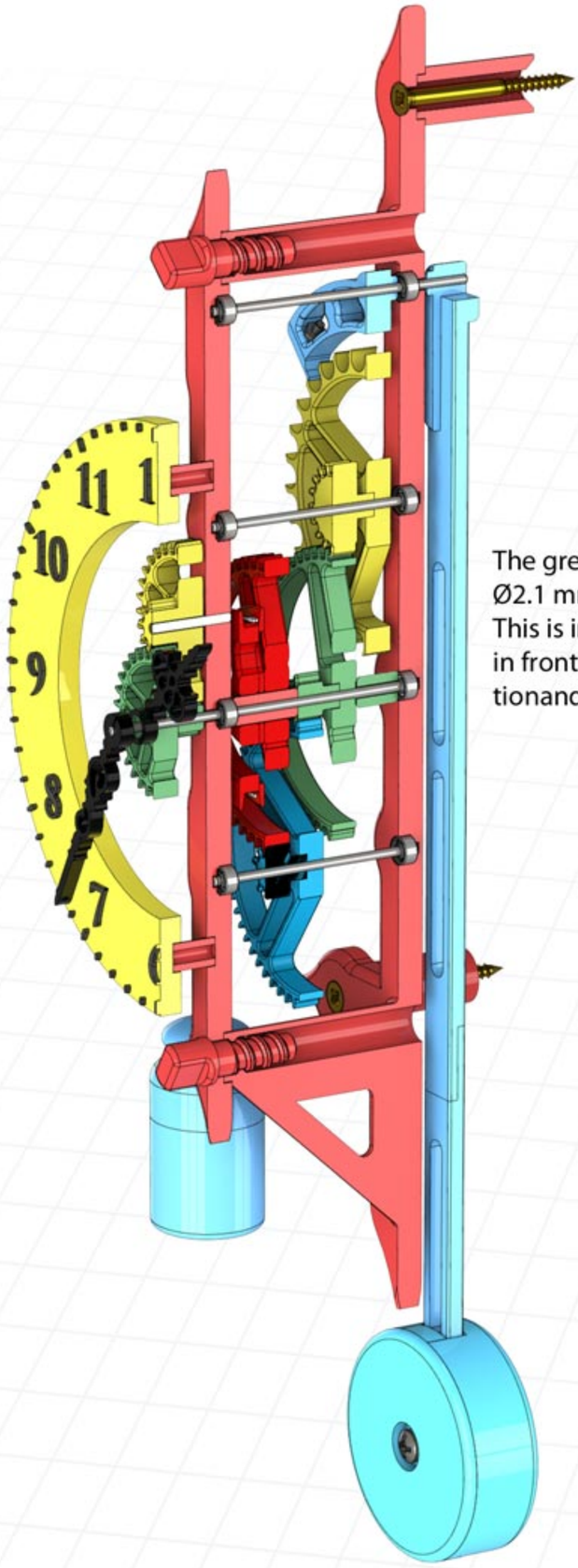




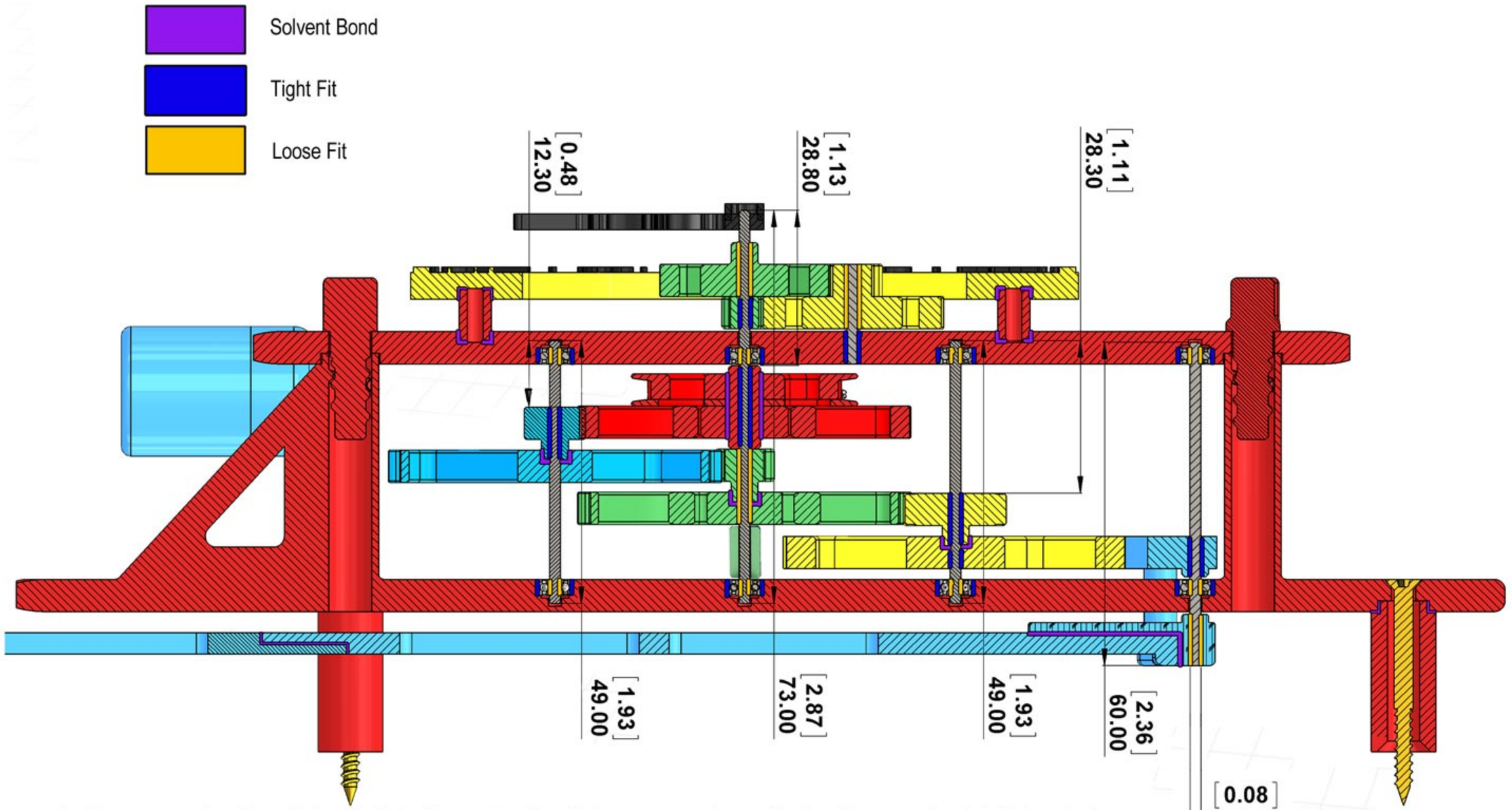
After fitting the front frame the hour gears can be fited to the two shafts protruding from the front face The 8 tooth gear needs to be tight to drive the others, but not so tight that you can't pull it off when you need to dismantle the clock.



The Pallets are fitted to either side of the Escapement using a 2mm screw nut and washers. The The pallets are adjustable in and out to enable you to get the clock running evenly. If you start with the pallets fitted so that the top edges are level with the top edge of the escapement the clock should theoretically Tick Tock evenly . If it does, leave it at that setting, if it doesn't then start to adjust the pallets until it does.



The green gear pair should be drilled out to Ø2.1 mm to be a free running fit on the shaft. This is importand as the red drive gear assembly in front of it is rotating in the opposite direc-tionand is a tight fit on the shaft.



In this cross section through the clock the fits required for all the parts are shown, the bearings are all a tight fit into the front and back plates, and the shafts are all a loose fit in the bearings. The plastic gears are all a tight fit on their respective shafts except for the green gears which are to be a loose fit.
The joints shown in orange are solvent bonded.
The shafts themselves are all 2mm diameter with their lengths shown above, along with a positioning dimension ffor the

Clock 13 FDM Version - 6